What is claimed is:

1. A method of chemical species suppression for MRI imaging of a scanned object region comprising:

acquiring K space data at a first TE;

acquiring K space data at a second TE;

reconstructing images having off resonance effects;

estimating off resonance effects at locations throughout the reconstructed image; and

determining the first and second chemical species signals at image locations of the scanned object from the acquired signals and correcting for blurring resulting from off resonance effects due to B_0 inhomogeneity.

2 The method defined in claim 1 wherein the steps of acquiring K space data at the first TE and the second TE comprise acquiring signal components from first and second chemical species.

3. The method defined in claim 1 further comprising acquiring K space data at a third TE.

4: The method defined in claim 3 wherein the step of acquiring K space data at the third TE comprises acquiring signal components from first and second chemical species.

5. The method defined in claim 1 wherein the step of estimating off resonance effects comprises generating an estimated field map.

6. The method defined in claim 5 wherein the step of generating an estimated field map comprises:

a. estimating the off resonance effects for a first location comprising:

i. providing a frequency,

ii. estimating signal components for first and second chemical species at the provided frequency,

iii. calculating an estimated signal of the first and second chemical species at the provided frequency,

iv. calculating the difference between the estimated and acquired signal at the provided frequency, and

v. repeating steps i. - iv. for different frequencies to find the frequency that minimizes the difference for the first location; and

b. repeating steps i. – v. for other locations in the estimated field map.

7. The method defined in claim 6 further comprising using region growing to create a frequency field map for the scanned object.

8. The method defined in claim 7 further comprising determining a frequency determined region as the value of f_j that minimizes D_{local} where D_{local} takes the single minimum in the D_{local} - f_j plot.

9. The method defined in claim 7 further comprising expanding the frequency determined region so that the frequency field map can be created for the scanned object region.

10. The method defined in claim 9 further comprising finding the correct frequency f_j at each pixel in a 'frequency to-be-determined region' which abuts the 'frequency determined' region.

11. The method defined in claim 10 wherein the step of finding the correct frequency f_j comprises choosing the value of f_j at each pixel that borders the frequency determined region which creates a local minima in the D_{local} - f_j plot, and is the closest to the average local frequency of the neighboring pixels in the frequency determined region.

12. The method defined in claim 5 wherein the step of generating an estimated field map comprises:

a. estimating the off resonance effects for a first location comprising:

i. providing a frequency,

ii. estimating signal components for first and second chemical species at the provided frequency,

iii. determining whether the signal components have the same or opposite phases at the provided frequency, and

iv. repeating i. – iii. for another frequency if the signal components do not have the same or opposite phases; and

b. repeating steps i. – iv. for other locations in the estimated field map.

13. The method defined in claim 1 further comprising using an off resonance correction method to eliminate the effects of local B_0 inhomogeneity on the first chemical species.

14. The method defined in claim 1 further comprising using an off resonance correction method to eliminate the effects of local B_0 inhomogeneity on the second chemical species.

15. The method defined in claim 1 further comprising using an off resonance correction method to eliminate the effects of local B_0 inhomogeneity on the first chemical species and the second chemical species.

16. The method defined in claim 5 reconstructing images of the first and second chemical species based on frequencies indicated in the frequency field map at each pixel location having blurring due to the off resonance effects of local B_0 inhomogeneity.

17. The method defined in claim 1 wherein the first chemical species is water and the second chemical species is fat.

18. The method defined in claim 16 further comprising demodulating the first and second chemical species images with demodulation frequencies f_l and $f_l + f_s$ to create locally deblurred images of the first and second chemical species respectively.

19. The method defined in claim 18 reconstructing the entirely deblurred first chemical species image by combining the deblurred regions of first chemical species images from each local frequency, f_l, in the frequency field map.

20. The method defined in claim 18 reconstructing the entirely deblurred second chemical species image by combining the deblurred regions of second chemical species images from each local frequency, fs, in the frequency field map.

21. The method defined in claim 1 further comprising using more than one coil for obtaining the data sets using a weighted average from signals of each coil when minimum local difference between acquired signals and estimated signals is

$$D_{pixel} = | S_0 - (\overline{W}'_j + \overline{F}'_j) | + | S_1 - (\overline{W}'_j + \overline{F}'_j \exp(i\phi_{fs})) \exp(i\phi_j) |$$
$$+ | S_2 - (\overline{W}'_j + \overline{F}'_j \exp(i2\phi_{fs})) \exp(i2\phi_j) | .$$

22. The method defined in claim 1 further comprising acquiring a plurality of interleaves, wherein each interleave uses a different TE and the sampling density of each interleave is sufficient to create a low resolution image.

23. The method defined in claim 22 wherein the sampling density of each component sufficiently oversamples k space to create a low resolution image of the object at that TE.